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Endonuclease from gram-negative bacteria Serratia marcescens is as effective as pulmozyme in the hydrolysis of DNA in sputum

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Abstract

© 2018 Vafina, Zainutdinova, Bulatov and Filimonova. One of the approaches to effective airway cleansing is the degradation of DNA into smaller fragments. For this purpose Pulmozyme® is used with high efficacy because it contains recombinant DNase I as its active component. The aim of the study was to comparatively analyze DNase activity of Pulmozyme® and the nuclease from gram-negative bacteria Serratia marcescens, because at optimal conditions the catalytic efficiency of the nuclease is much higher than the efficiency of DNase I. Highly polymerized DNA and purulent-mucous sputum were used as substrates. The examination showed that both S. marcescens nuclease and Pulmozyme® hydrolyzed DNA in sputum. Also S. marcescens nuclease was found capable of hydrolyzing DNA in conditions that are standard for Pulmozyme® and suitable for its therapeutic application. For manifesting the similar hydrolytic activity the nuclease amount in the assay mixture containing highly polymerized DNA or the sonicated sputum and NaCl together with calcium- or magnesium- cations can be about 10- time lower than that of the recombinant DNase I. In the presence of magnesium cations the DNase activity of both S. marcescens nuclease and Pulmozyme® was higher than in the presence of calcium cations.

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Keywords

Hydrolysis of DNA, Pulmozyme, Serratia marcescens nuclease, Sma nuc, Sputum

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